work, which was perfectly sound and free from cracks, nothing having ever peeled off from it. The situation exposed to the weather in the greatest degree.

N.B. The coal half-bushel above mentioned holds exactly thirteen gallons, wine measure.

It has been the general received opinion here, that plaster made with sea sand, unless well washed in fresh water, would be always damp, but on the contrary, I find, from what has been done in my dining-parlour and passage, it has been always quite dry, although the whole of the sand with which it has been done has been thrown up by the sea, and must have been always at spring tides covered with sea water.

Method of sawing Cast Iron; by M. Dufaud, *Director of the Iron works at Montalaire, near Creil. Communicated in a Letter to* M. D'Arcet.

(From the Annales de Chimie.)

I have undertaken, with the greatest pleasure, the experiments on sawing hot cast iron, that you recommend to me: I have followed your instructions; my trials have been attended with the most complete success, and I hasten to give you an account of them.

These experiments were the more interesting to me, as I have since applied them to practical purposes.

My first trial was made with the support of a grate, 108 mil. [4.25 in.] thick. This piece of cast iron was heated in a forge fire with coal: and as soon as it had acquired a sufficient degree of *incandescence*, [this is the French term,] in was placed on an anvil, and I sawed it with a common carpenter's saw, without any difficulty, and without any injury to the saw, which I dipped immediately into cold water. The carpenter continued to work with the same saw, without having any occasion to repair it.

In this, my first trial, a little accident occurred. The end of the iron I was sawing off not being supported, it broke, when 20 or 25 m. (about a line,) remained to be cut through; but this slight defect I immediately removed with the saw. Convinced of the ease with which a common saw would cut hot cast iron, I afterwards applied it to the demands of the iron works.

I had to shorten a pivot of 135 m. [5 3 in.] in diameter; but, afraid of its breaking if I cut it cold, an operation besides very tedious and uncertain, unless executed in a lathe, I had resolved to cast another, when the experiment just mentioned determined me to saw it.

Having marked the place of section with red lead, I placed the pivot in a reverberatory furnace; and when I thought it sufficiently hot, I had it taken out of the furnace, and placed on an iron support, so that the two ends had equal bearings. In four minutes, with two saws, which I used and cooled alternately, the piece was cut off, to the great astonishment of my workmen, who found the saws unhurt.

The same day, I performed a still more difficult operation. I had an anvil, which I was about to cast afresh, because it was 41 m. [1.6 in.] too thick, so to that it could not be placed in its bed.

I marked the place of the saw kerf with red lead. The two cuts to be made were 217 m. [8.5 in.] long, by 189 m. [7.4 in.] high; and the thinness of the piece to be cut off required precision. This anvil was heated in a reverberatory furnace, in the same manner as the pivot; and, when sufficiently hot, two workmen took hold of it with a strong pair of tongs, and laid it on a block of cast

iron. It was cut with much ease and precision by the same saws that had been used in the preceding instance.

In the course of these experiments, I remarked,

1. That hot cast iron may be sawed as easily, and in the same space of time, as dry wood.

2. That, to diminish the resistance, the saw should be set fine.

3. That iron heated in a furnace saws more easily than if heated in a forge: and the reason is simple; in a furnace, it is heated equally throughout, while in a forge the part near the tewel is almost in a state of fusion, while that opposite to it is scarcely red hot.

4. That the iron must not be made too hot; for, if its surface be too near a state of fusion, the saw will be clogged, and the process will not go on well.

5. That the saw should be moved very quickly, because then it will be less heated, make its way better, and the cut will be more clean and exact.

6. Lastly, That the iron should be so placed as to have a firm bearing every where, except where the saw is to pass, otherwise it is liable to break before the cutting is finished.

These, Sir, are the whole of my experiments and observations; and I shall be well pleased if they answer your views.

It is the more to be wished, that this method of cutting cast iron be rendered as public as possible, as it may be happily applied in many arts. I thank you much for having suggested it to me, for I shall find frequent occasions for it.

Note by M. D'Arcet.

Several years ago, Mr. Pictet observed a workman saw a cast iron pipe in the workshop of Mr. Paul, of Geneva. He had lately occasion to mention this to Thenard, who afterwards communicated it to Mr. Mollard. Mr. Mollard, struck with the uses to which it might be applied, tried it at the Conservatory of Arts and Trades, on pieces of cast iron 7 cent. [2.75 in.] square, and on plates of different thicknesses.

Mr. Mollard used a common saw, and succeededly perfectly with various pieces, without injuring its teeth. He observed, that the iron should be heated only to a cherry red; and that it should be cut briskly, using the whole length of the saw. Mr. Mollard afterward found, that this process was known to a workman of Mr. Voyenne, who practised it in fitting the cast iron plates used for making stoves. It is probable, that this simple operation may be known in other workshops; but it is lost, as it were, since eminent persons in the arts are generally ignorant of it.

We see, that the experiments mentioned in Mr. Dufaud's letter, confirm the account of Mr. Pictet, and the trials of Mr. Mollard: of course, there remains no doubt of the possibility of cutting cast iron when hot, or of the utility of the process.

We conceive, it would be practicable to employ in the fabrication of iron cannons, for cutting off the cap of the piece, and even for the removing the square piece at the extremity of the button, which serves for mounting it on the boring machine. Perhaps advantage might be taken of the red heat, which the cannon retains long after it is cast, for sawing off the cap in the mould itself, its upper part only being removed.

The same process would certainly furnish an easy and ready method of cutting a cannon to pieces, and thus rendering it unserviceable; or facilitate its melting in the reverberatory surface, when required to be cast afresh. Perhaps it might be

employed also to ascertain the different ranges of a piece of cannon, shortened by little and little. The knowledge of a practice applicable to so many purposes of the arts cannot be too generally made known.

Description of the new American Steam Boat, which crosses the Hudson, between New-York and Jersey.

It is formed of two vessels, each about 80 feet long; these are decked as one, leaving a space between them sufficiently wide to admit the wheel by which the boat is propelled. In the centre of the deck is the engine-house, containing the machinery, which puts the wheel, immediately below it, in motion; the space on deck, on one side of the engine-house, (covered by an awning,) is appropriated to foot passengers, and on the other side, to horses and carriages; passengers can also be accommodated at the top of the engine-house, and below the deck.

The vessel is furnished with one rudder at each end, by which means it is unnecessary to change her direction during the whole passage, as what served for the rudder from New-York to Jersey, answers for a cut-water from Jersey to New-York. The advantages of such a vessel, which, independent of wind or tide, performs its passage in a given time, must be obvious, both for the ordinary purposes of a ferry-boat, and for the removal of troops and military stores. During the month of September last, it carried over 500 passengers, together with 5 horses and carriages.

[*Liverpool Mercury.*]

Extraordinary Mechanical Genius, discovered in the invention of a curious Clock.

A youth of the name of Benjamin Caldwell, of Frodsham, in the county of Cheshire, has made a wooden model of a clock, for showing the various situations of the sun and moon, the times of the luminations, the rising, southing, and setting of the moon and stars, the moon's age and phases, the sun and moon's place in the ecliptic for every day in the year, and the day of the month, which will show for four successive years, without altering each month, as in common clocks; it also shows the days of the week, time of high water, and other phenomena. In the centre of the dial-plate is turned round the minute and hour hands, and two wires about four inches long, at the ends of which are fastened flat round pieces of metal, resembling the sun and moon. The sun is carried round in 24 hours, to which is fastened a circle, with the moon's age upon it. The moon is carried round in 24h. 50½m. whose wire projects a little beyond the moon, showing her age upon this circle, to every half and quarter day. Under the dial-plate, and showing through a somewhat oval hole of 4½ inches diameter, in the centre is a plate, carried round in 23h. 56m. 17s.; the middle of this plate represents the north pole, and on it is marked the two tropics, the equinoctial and ecliptic, the principal fixed stars, the day of the month, &c. The edge of the dial-plate round the hole, represents the horizon; the sun revolves round in 24 hours, the dial and centre plate, in 23h. 56m.; the sun will advance nearly one degree every day in the ecliptic, so that in 365 days and 5 hours, he will have gone through all the 360 deg. The centre plate goes round in the same time as the stars seem to go round, by the diurnal motion of the earth, and it may be seen at any time what stars are